



**Joshua Lederberg**

## Biology Could Add Little To Hitlerian Repertoire

EVERY WEEK, dozens of research papers on molecular biology are published in *Nature*, the *Journal of Molecular Biology*, the *Proceedings of the National Academy of Sciences* and similar scientific journals. They are the tightly woven threads of a beautiful and intricate tapestry, the fragments of our knowledge of the machinery of the living cell. For the specialist, it is a formidable task to maintain a current knowledgeability about the advances in his own field.

The basic ideas of DNA chemistry and function are not complex by comparison with the mathematical apparatus of modern physics or with the intricacies of the experimental procedures by which these ideas are tested. Most details of incremental advances are, however, inaccessible to the lay reader simply because of the elaborate background of unfinished fabric that has to be mastered to understand them. From time to time, some local pattern emerges on the collective loom which appears more intelligible and permits a pause in appreciation.

WE LIVE in a pragmatic culture that subordinates discovery to invention; many of us are quite incapable of perceiving a new insight until we hear how it can be applied to "do" something. At one level, this was the appeal to scientific readers of the report some weeks ago from Harvard of a technique for the "isolation of a gene" from bacteria.

At another level, through news channels, the exposition of their work by Drs. Jim Shapiro and Jon Beckwith emphasized hypothetical biological engineering applications to the detriment of public clarity about the scientific implications of their achievement. They were quoted as having expressed grave concern about the potential abuse of their science—which led to some headlines in London that read, "GENETIC BOMB FEARS GROW."

What has not come through is precisely what they were concerned about. I believe they correctly pointed to the possible abuse of the whole fabric of modern experimental biology rather than of the single ingenious thread they helped weave into it.

The most grievous potential for abuse was, in fact, the subject of a major shift in U.S. policy within days of the Harvard biochemists' report. On Nov. 23, President Nixon unilaterally pledged the country to drop its work on the development of biological weapons. Subsequently, toxin weapons were included in the ban and the United States has joined in formal proposals for global prohibitions on biological warfare.

Until such agreements are ratified and implemented, the danger still remains that the most sophisticated aspects of scientific biology, on the trail of the essence of life, will be mobilized in the service of an attack on large parts of the world's population. We have begun to follow the right track perhaps just in time, before other

warrior nations develop comparable scientific skills in this area and we respond with an unstoppable escalation.

WHEREAS GENETIC engineering is a tangible reality for bacteria and viruses, it is a futuristic speculation for direct application in the human organism. Closest on the horizon are some approaches toward the engineering of viruses for the improvement of conventional vaccines, or to reintroduce the codes for disease-related enzymes that may be missing because of a genetic defect.

It is not obvious how these applications raise questions much different from those already encompassed by medical practice. They may also bypass any motive to deal with genetic diseases by direct intervention in the genes as inherited through sperms and eggs, should this become technically possible.

We cannot, of course, overlook the fear that an authoritarian regime may impose its engineered designs on the life styles of its subjects. To think of this as a side-effort of biological research may divert attention from the real dimensions of the problem, which is slavery, and its sources in moral, social, military or political disasters.

Its inhuman ends have been well served historically by techniques both frightful and insidious: Hitler's exterminatoria, forcible impregnation and sterilization, drugs and thought control. Molecular biology will have little to add to that repertoire.

We should nevertheless seek to extend the groundwork of law to bolster the freedom of the person. The prevalent laws restricting abortion amount to compulsory pregnancy on a large scale, an intrusion on personal freedom and privacy as repugnant as compulsory abortion. The decision about abortion is one for private morals, but the woman who voluntarily forgoes an unwanted child prevents a crime against him and does a service to the community which deserves our compassionate support.

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